

REMARKS

Reconsideration and further examination of this application is hereby requested. Claims 1-18, 20-35, 37-43, 45-55, 57-80, and 82-110 are currently pending in the application. Claims 19, 36, 44, 56, 81 have been canceled. Claims 89-110 are newly added.

**A. The Interview**

Applicant appreciates the courtesy extended by Examiner Chawan and SPE Mehta in the personal interview of June 29, 2004. Discussion focused on identifying distinctions between the present invention and the prior art and determining what claim language would be mutually acceptable to define those distinctions clearly.

During the interview an agreement was reached that the claims would define over the prior art if they were limited to i) a fixed optical system, ii) a single sensor, and iii) a ball grid array (BGA), and if the application were terminally disclaimed with respect to two co-pending applications (nos. 09/351,892 and 09/844,323) and three related patents (US 6064756, US 6064757, and US 6072898).

**B. The Terminal Disclaimer**

Although a Terminal Disclaimer has already been filed in this application, the topic was discussed in greater depth during

the interview. In order to eliminate any possible question of double patenting issues arising from the family of related applications and issued patents, it was agreed that submission of a terminal disclaimer would be appropriate. Thus, submitted herewith is a terminal disclaimer as agreed.

**C. The Enablement Rejection**

Claims 1-88 have been rejected under 35 U.S.C. § 112, ¶ 1st, as not being enabled by the specification. Specifically, the Examiner questions how a single sensor can be used to obtain at least two differing views. This rejection is respectfully traversed based on the following argument.

As discussed during the interview, the embodiment of the invention toward which the claims in this application are directed is illustrated in Fig. 17. The optical system illustrated in Fig. 17, and described in the corresponding text of the specification makes clear how two different views of the same part are made to impinge on a single sensor.

In view of the above, Applicant respectfully asks that the enablement rejection be carefully reconsidered and withdrawn.

**D. The Obviousness Rejections**

Claims 1-7, 9-29, 34-43, 45-53, 56-60, 62-79, and 81-88 have been rejected under 35 U.S.C. § 103(a) as being obvious over Liu et al. (US 5859924) in view of the Shenghua Ye et al. article

entitled "Vision-based system calibration for dimensional inspection." Claims 31, 33, 44, 55, and 80 have been rejected under 35 U.S.C. § 103(a) as being obvious over Liu et al. in view of Shenghua Ye et al., and further in view of King et al. (US 6236747). Claims 8, 30, and 61 have been rejected under 35 U.S.C. § 103(a) as being obvious over Liu et al. in view of Shenghua Ye et al., and King et al., and further in view of Svetkoff et al. (US 5617209). Claims 32 and 54 have been rejected under 35 U.S.C. § 103(a) as being obvious over Liu et al. in view of Shenghua Ye et al., King et al., and Svetkoff et al., and further in view of Roy et al. (US 6118540). These rejections are respectfully traversed based on the following arguments.

In order for a patent claim to be obvious, the prior art must teach or fairly suggest each and every limitation of that claim. That is because the claim must be considered as a whole.

Independent system claim 1 (as amended) recites the limitation of "illuminating ... using a fixed illumination system" at lines 6-7. This distinguishes the claimed invention from references showing "structured" illumination that must be scanned or moved. Amended independent apparatus claims 24 (refer to lines 4-5), 48 (refer to lines 4-5), 69 (refer to lines 6-7), and 70 (refer to lines 5-6) each recite a similar limitation.

Independent method claim 1 (as amended) recites the limitation of a "single sensor" at line 8. Amended independent apparatus claims 24 (refer to line 6), 48 (refer to line 6), and 69 (refer to line 8) each recite a similar limitation. Independent process claim 70 (as amended) recites the limitation of a "single camera" at line 8.

Independent method claim 1 (as amended) is limited to "inspecting ball grid array devices" at line 2. Amended independent method claims 24 (refer to lines 1-2), 48 (refer to lines 1-2), 69 (refer to lines 1-2), and 70 (refer to lines 1-2) each recite a similar limitation.

As agreed during the interview, the prior art of record does not teach or suggest this combination of limitations. Accordingly, it is respectfully submitted that the prior art of record do not support a *prima facie* case of obviousness with respect to claims 1-18, 20-35, 37-43, 45-55, 57-80, and 82-88.

#### **E. Clarifying Amendments**

A number of amendments have been made solely for the purpose of improving the clarity of the claims. Claims 19, 36, 44, 56, and 81 have been canceled so as to eliminate redundant recitation of limitations. Claims 13, 14, 20, 21, 31-33, 37-39, 46, 52-55, 57, 63, 64, 79, and 82-88 have been amended to be consistent with language recited in claims from which they depend.

**F. The New Claims**

New dependent claims 99 and 105 are directed toward more clearly defining one aspect of the invention in the situation where more than one light source is used to illuminate the ball grid array. As is consistent with the disclosure of the prior art publication US 5245671 to *Kobayashi*, Applicant claims the use of plural light sources that are spectrally diverse from one another.

New dependent claims 89-91, 94-96, 100-102, and 106-108 are directed toward more clearly defining one aspect of the invention in that the lead of the BGA being inspected is limited variously as being a contact, a pin, bump contact, ball contact, pad, or pedestal. To aid in the understanding of the meanings of these terms in the context of ball grid array lead inspection, Applicant refers to definitions provided in the glossary section of the textbook *Ball Grid Array Technology*, edited by John H. Lau. Selected pages of this glossary are submitted herewith and are listed on an accompanying form PTO-1449. This publication existed on a date prior to the date of application herein and would have been known to those skilled in the art.

New dependent claims 92, 93, 97, 98, 103, 104, 109, and 110 are directed toward more clearly defining alternate modes of operation of the present invention to provide either combined or

discrete images of the multiple views of a ball grid array device.

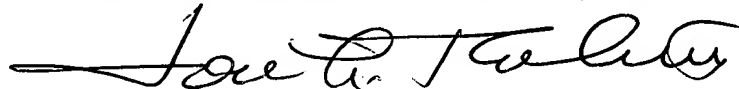
**G. Closing**

For the above reasons, Applicant respectfully submits that the application is in condition for allowance with claims 1-18, 20-35, 37-43, 45-55, 57-80, and 82-110. If there remain any issues that may be disposed of via a telephonic interview, the Examiner is kindly invited to contact the undersigned at the local exchange given below.

The Director of the U.S. Patent & Trademark Office is authorized to charge any necessary fees, and conversely, deposit any credit balance, to Deposit Account No. 18-1579.

Respectfully submitted,

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